

U.S. Patent Application Serial No. 10/710,775
Amendment dated July 27, 2005
Reply to OA of May 3, 2005

AMENDMENTS TO THE CLAIMS:

Claims 4, 7 and 8 have been amended as follows. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Original): A high-frequency device comprising:

a semiconductor substrate;

a high-frequency circuit layer formed at a surface of said semiconductor substrate and including a circuit element and a multilayer wiring layer;

a plurality of electrically conductive pads formed on said high-frequency circuit layer and connected to an input and an output of high-frequency circuit and to a power source;

a plurality of rewiring layers formed on said high-frequency circuit layer via a first electrically insulating layer and respectively connected to said plurality of electrically conductive pads;

an electrically insulating sealing layer which is formed on said first electrically insulating layer and said rewiring layer and has a thickness larger than that of said multilayer wiring layer;

a plurality of mounting connection terminals which are provided on said electrically insulating sealing layer and correspond to said plurality of electrically conductive pads; and

a plurality of electrically conductive posts provided inside said electrically insulating sealing layer and between said rewiring layer and mounting connection terminals,

wherein the high-frequency circuit of said high-frequency circuit layer comprises an input amplifier for amplifying a high-frequency reception signal inputted from the electrically conductive post corresponding to said input and a power output amplifier for amplifying a high-frequency transmission signal and outputting the same from the electrically conductive post corresponding to said output; and

wherein a first electrically conductive post corresponding to said power source has a first diameter;

a second electrically conductive post corresponding to the input of said input amplifier has a second diameter which is less than said first diameter; and

a third electrically conductive post corresponding to the output of said power output amplifier has a third diameter which is larger than said second diameter.

Claim 2 (Original): The high-frequency device according to claim 1, further comprising a first shielding layer provided over said high-frequency circuit layer, below said second or third electrically conductive post, and connected to a fixed potential.

Claim 3 (Original): The high-frequency device according to claim 2, further comprising a second shielding layer provided inside said multilayer wiring layer, below an electrically conductive pad connected to said second or third electrically conductive post, and connected to a fixed potential.

Claim 4 (Currently amended): The high-frequency device according to claim 1, wherein said second or third electrically conductive post and an electrically conductive pad corresponding thereto are formed so as to be close to or overlap each other,

said high-frequency device further comprising a ~~[[third]]~~ first shielding layer provided inside said multilayer wiring layer, below said second or third electrically conductive post and an electrically conductive pad connected thereto, and connected to a fixed potential.

Claim 5 (Original): The high-frequency device according to claim 1, comprising a first post structure in which said second or third electrically conductive post and an electrically conductive pad corresponding thereto are separated by a prescribed distance from each other, and a second post structure in which said second or third electrically conductive post and an electrically conductive pad corresponding thereto are formed so as to be close to or overlap each other,

wherein said first post structure comprises a first shielding layer provided over said high-frequency circuit layer, below said second or third electrically conductive post, and connected to a fixed potential, and a second shielding layer provided inside said multilayer wiring layer, below an electrically conductive pad connected to said second or third electrically conductive post, and

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connected to a fixed potential, and

said second post structure comprises a third shielding layer provided inside said multilayer wiring layer, below said second or third electrically conductive post and an electrically conductive pad connected thereto, and connected to a fixed potential.

Claim 6 (Original): The high-frequency device according to claim 1, wherein a plurality of said first electrically conductive posts corresponding to the same power source are arranged with a high density, and said second or third electrically conductive posts are arranged with a density lower than that of said first electrically conductive posts.

Claim 7 (Currently Amended): A high-frequency device according to Claim 1, further comprising a [[A]] high-frequency device module comprising a first high-frequency device for processing a signal of a first high-frequency band and a second high-frequency device for processing a signal of a second high-frequency band which is higher than said first high-frequency band, ~~those devices being high-frequency devices according to claim 1,~~

wherein the height of the electrically conductive pads of the second high-frequency device is larger than the height of the electrically conductive pads of the first high-frequency device.

Claim 8 (Currently Amended): The high-frequency device according to claim 1, further comprising :

a [[second]] first shielding layer provided inside said multilayer wiring layer, below the electrically conductive pad connected to said second or third electrically conductive post, and connected to a fixed potential; and

an inductor provided on said high-frequency circuit layer, between said rewiring layers, and having a spirally wound structure,

wherein an impedance matching circuit of said input amplifier or power output amplifier is composed of said inductor and a capacitance between said electrically conductive pad and the [[second]] first shielding layer.

Claim 9 (Original): The high-frequency device according to claim 1, further comprising:

a first shielding layer provided on said high-frequency circuit layer, below said second or third electrically conductive post, and connected to a fixed potential; and

an inductor provided on said high-frequency circuit layer, between said rewiring layers, and having a spirally wound structure,

wherein an impedance matching circuit of said input amplifier or power output amplifier is composed of said inductor and a capacitance between said electrically conductive pad and the first shielding layer.

Claim 10 (Original): The high-frequency device according to claim 1, further comprising:

a third shielding layer provided in said multilayer wiring layer, below said second or third electrically conductive post and an electrically conductive pad connected thereto, and connected to a fixed potential; and

an inductor provided on said high-frequency circuit layer, between said rewiring layers, and having a spirally wound structure,

wherein an impedance matching circuit of said input amplifier or power output amplifier is composed of said inductor and a capacitance between said electrically conductive pad and the third shielding layer.

Claim 11 (Original): A high-frequency device module comprising first and second high-frequency devices each comprising:

a semiconductor substrate;

a high-frequency circuit layer formed at a surface of said semiconductor substrate and including a circuit element and a multilayer wiring layer;

a plurality of electrically conductive pads formed on said high-frequency circuit layer and connected to an input and an output of high-frequency circuit and to a power source;

a plurality of rewiring layers formed on said high-frequency circuit layer via a first electrically insulating layer and respectively connected to said plurality of electrically conductive pads;

an electrically insulating sealing layer which is formed on said first electrically insulating layer and said rewiring layer and has a thickness larger than that of said multilayer wiring layer;

a plurality of mounting connection terminals which are provided on said electrically insulating sealing layer and correspond to said plurality of electrically conductive pads; and

a plurality of electrically conductive posts provided inside said electrically insulating sealing layer and between said rewiring layer and mounting connection terminals,

wherein said first high-frequency device comprises a first high-frequency circuit for processing a signal of a first high-frequency band, and said second high-frequency device comprises a second high-frequency circuit for processing a signal of a second high-frequency band which is higher than said first high-frequency band; and

the height of the electrically conductive posts of the second high-frequency device is larger than the height of the electrically conductive posts of the first high-frequency device.

Claim 12 (Original): The high-frequency device module according to claim 11,

wherein said first and second high-frequency circuits each comprise an input amplifier for amplifying a high-frequency reception signal inputted from the electrically conductive post corresponding to said input and a power output amplifier for amplifying a high-frequency transmission signal and outputting the same from the electrically conductive post corresponding to said output; and

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wherein a first electrically conductive post corresponding to said power source has a first diameter;

a second electrically conductive post corresponding to the input of said input amplifier has a second diameter which is less than said first diameter; and

a third electrically conductive post corresponding to the output of said power output amplifier has a third diameter which is larger than said second diameter.